

# THE ABERDEEN CHEMICAL AGENT DISPOSAL FACILITY

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## Introduction

In October 1998, a team was established to design, construct, operate, and—ultimately—close the Aberdeen Chemical Agent Disposal Facility (ABCDF) at Aberdeen Proving Ground (APG), MD. This \$616 million ABCDF pilot plant will dispose of the mustard agent (HD) currently stored at the Edgewood area of APG. Overseen by the Program Manager for Chemical Demilitarization, the ABCDF is a prototypical research, development, test and evaluation (RDT&E) project that will use hydrolysis and biotreatment for HD destruction.

Risk management is critical to the success of any RDT&E project or program. In the case of the ABCDF project, the Army and its systems contractor, Bechtel National Inc.-Aberdeen, are identifying challenges to the project that may arise from federal and state regulators, community scrutiny, design issues, construction and operational needs, budgets, and schedules. To assist in the identification, evaluation, and management of probable risks, the ABCDF project team developed a management tool, the risk list, in conjunction with the project's Earned Value Management System, while revising its estimate at completion (EAC). The project team spent 1 year assembling a detailed bottoms-up cost estimate for the revised EAC. The resulting risk list allows project managers to document, evaluate, prioritize, and manage major risks, thus avoiding or minimizing impacts to cost and schedule.

This article highlights how ABCDF project managers are using the risk list and how its implementation benefits the project.

## Defining The Risk List

Developed in 1999, the risk list is a detailed spreadsheet of actual, probable, or potential risks that are prioritized, evaluated, and rated for management action and follow-up. The list includes any risk that the ABCDF project team deems significant in answering three basic questions: What is the likelihood that a particular event will happen? If the event does happen, what will be the magnitude of its impact? Are we able to mitigate the risk now?

Soliciting input from all the project team members helped the team to create an initial list of risk items that could impact the ABCDF project. The team identified major assumptions regarding cost (e.g., staffing ramp-up/levels), schedule (e.g., construction and operation timelines), and those items perceived to be vulnerable to certain risks (e.g., hiring required staff). A risk inventory (accompanying chart) and the *ABCDF Work Breakdown Structure Dictionary* were used to identify other applicable risks.

## Risk-List Advantages

The primary benefit of using the risk list is that major risks are identified before they occur, thus allowing management to develop mitigating actions in a timely manner.

Secondary benefits include more effective partnering and team building by Army and Bechtel-Aberdeen personnel and the historical documentation generated while addressing potential risks. In addition, the historical documentation can be used as a reference tool for other demilitarization projects. The risk list also meets requirements of DoD Directive 5000.1, *The Defense*

*Acquisition System*, which instructs program managers to use risk management tools and continually assess program risks.

However, the overall benefits to the project are cost and schedule savings. For example, the ABCDF project team made aggressive assumptions when preparing the project's EAC timeline, which must be properly managed to prevent cost overruns. One of these assumptions included scheduling less than 4 months of lead time for new personnel to obtain clearances to work on the chemical demilitarization program (the typical lead time could be more than 12 months). Because the time for employee clearances was identified as a potential cost and schedule risk, the project team is managing this risk and avoiding a cost increase of more than \$6 million.

## Generating Risk Ratings

In April 2000, the risk-list rating system was revised to help focus ABCDF's resources on the most critical issues. The risk-list format allows the user to enter issues or events and their associated risks and document the basis for the risk assessment and any associated risk-mitigation action plans. The scales and level of detail selected for the risk factors were based on the project team's assessment of the degree of accuracy that realistically could be applied to most risk items.

Each risk item is assigned a probability (P), an impact to performance (I) (i.e., cost and schedule), and an urgency factor (U). The risk rating (RR) is determined by multiplying these three factors ( $P \times I \times U = RR$ ) and then ranking the risk item relative to all other risk items. The probability factor is based on a scale of one through three. One is low (less than 25 percent probability of occurrence); two represents medium (25-75 percent probability of occurrence); and three means high (greater than 75 percent probability of occurrence). The impact to performance factor scale also uses the one through three rating format. However, for use on other projects, the rating scale should be project-specific and adjusted to measure risk impacts to the project's expected total cost and schedule. For example, the risk of a 1-day schedule delay during the course of a 1-week project will register a higher

## Typical Sources Of Risk

### External

Personnel  
Data  
Supplier Viability  
Regulations  
Political Actions  
Environmental  
Transportation

### Internal

*Technical*  
Maturity  
Changing Requirements  
Design Errors  
*Schedule*  
Unrealistic Requirements  
Incomplete Identification of Tasks  
*Cost*  
Design and Configuration  
Competitive Environment

### Technical

Operational Environment  
System Environment  
Environmental Impact  
Software Language  
Configuration Management  
Parts Quality  
Design Errors  
External/Internal Interfaces  
Maintenance

rating than a 1-week delay on a 5-year project.

The urgency factor is configured on a slightly different scale of 0.1 to 1.0 and estimated to the nearest 0.1. It is an estimate of the need to address a risk item based on the project's status and the team's ability to reduce the probability or impact. A rating of 0.1 to 0.3 is low and does not warrant immediate attention. A 0.4 to 0.7 rating is considered medium, which means there is a reasonable need for mitigating the risk factor in question. A rating of 0.8 to 1.0 is high and indicates that mitigation steps must be taken immediately. Once the risk ratings are calculated, they are ranked from highest to lowest. However, the risk list is a living document, and risk ratings can move up or down based on changing conditions. The list also can be sorted in a number of ways such as by probability, impact, and urgency.

### Risk-List Administration

Co-chairpersons (one Army and one system contractor representative) are selected by senior members of the ABCDF project team to oversee the risk list. They maintain the list, periodically assess risk items, and request and compile updates. In addition, the co-chairpersons assign risk-item lead personnel (subject to managerial approval), normalize data as appropriate, schedule and lead the risk-list meetings, and communicate key risk items and responsibilities.

Any ABCDF project member or stakeholder may recommend risk items be added to the list or provide input on existing items via the risk-list co-chairpersons. Once a risk item is identified, a minimum of two leads—one Army and one system contractor repre-

sentative—are assigned to monitor the risk item. The lead personnel are also responsible for documenting and maintaining the risk item(s) on "backup" sheets, which typically include a risk-item description, potential impact (general description), risk-factor ratings (P, I, and U), the basis for the risk-factor ratings, proposed action plan, and a history documenting all activities associated with the item.

Lead personnel must reach concurrence with their co-leads on risk-item documentation. Individual risk-item backup sheets are then compiled to formulate the risk list. The co-chairpersons review the risk list to ensure uniformity in scoring and risk rating before the list is reviewed and used by project team members. If an identified risk item does not require further action, it is archived for future reference.

Working groups meet periodically to ensure that the risk list is current and that action plans for identified risks are appropriate and progressing. During these reviews, risk items that have been mitigated or are no longer valid are archived to ensure that a history is maintained. Risk items that have received a high ranking are discussed at the system contractor's weekly staff meeting and at the Army and system contractor operations/management integrated product team meetings.

The project team also hosts biweekly Risk List Working Group meetings in addition to formal quarterly reviews and updates of all risk-list items.

### Conclusion

The risk list aids ABCDF project managers in evaluating and quantifying risk, which is not an exact science.

However, being able to reasonably assess a project's risks regardless of its life span or budget is critical to the success of that endeavor. On any project, the first step is to decide what type of risk management tool will be used and immediately implement it to assess and manage potential risks.

ABCDF's management team embraced risk when it decided to make a series of assumptions; weigh them against external, internal, and technical variables; and assign levels of probable impact to the project. All of this is done to identify issues and scenarios to ensure the successful conclusion of the ABCDF project. The effective partnering and teamwork by the Army and its systems contractor in the mitigating potential risks is an added benefit.

Managing risk for the ABCDF is proving to be a valuable tool in the safe and cost-effective disposal of Edgewood's mustard agent stockpile.

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